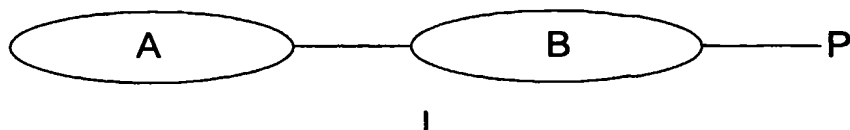


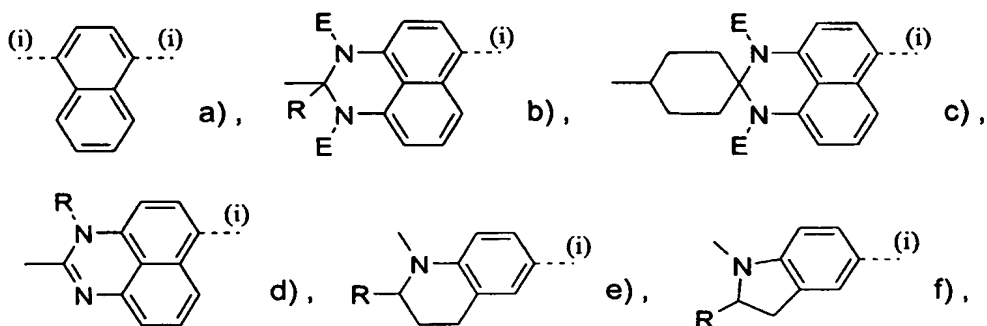
CLAIMS:

1. A polymerizable dichroic azo dye of the general formula I:



wherein:

10 A represents a dichroic residue, which may comprise one or more polymerizable groups PG, exhibiting at least partial absorption in the visible region between 400 nanometer and 800 nanometer and comprising at least one azo-binding group that is linked to at least one radical of formula a) to f) shown below,



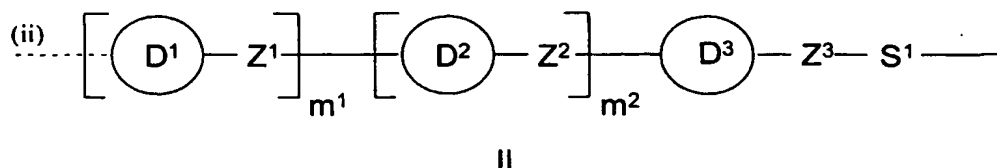
20 which radical of formula a) to f) may be unsubstituted, mono- or poly-substituted by fluorine, chlorine, hydroxy, $-NR^1R^2$ or by a straight chain or branched alkyl residue having 1-10 carbon atoms, which alkyl residue is unsubstituted, mono- or poly-substituted by fluorine, and wherein one or more of the non-adjacent CH_2 groups may independently be replaced by $-O-$, $-CO-O-$, $-O-CO-$, $-NR^1-CO-$, $-CO-NR^1-$, $-NR^1-CO-O-$, $-O-CO-NR^1-$, $-CH=CH-$, $-C\equiv C-$, $-O-CO-O-$, wherein R^1 and R^2 independently represent hydrogen or lower alkyl,

25 wherein the broken line (i) symbolizes the possible linkages to the azo-binding group and wherein

R represents hydrogen or lower alkyl;

E each independently represents hydrogen, lower alkyl, lower acyl or a polymerizable group selected from acryloyl or methacryloyl;

B represents a group of substructure II



wherein the broken line (ii) symbolizes the linkage to said dichroic residue and wherein:

10 D¹, D², D³ each independently represents an aromatic or alicyclic group, which is unsubstituted or substituted by fluorine, chlorine, cyano, nitro, or by a straight chain or branched alkyl residue having 1-10 carbon atoms, which alkyl residue is unsubstituted, mono- or poly-substituted by fluorine and wherein one or more of the non-adjacent

15 CH₂ groups may independently be replaced by Q, whereby Q represents -O-, -CO-, -CO-O-, -O-CO-, -Si(CH₃)₂-O-Si(CH₃)₂-, -NR-, -NR-CO-, -CO-NR-, -NR-CO-O-, -O-CO-NR-, -NR-CO-NR-, -CH=CH-, -C≡C-, -O-CO-O- and R has the meaning given above;

20 S¹ represents a single covalent bond or a spacer unit, such as a straight-chain or branched alkylene residue, which is unsubstituted, mono-substituted by cyano or halogeno, or poly-substituted by halogeno, having 1 to 24 carbon atoms, wherein one or more of the non-adjacent CH₂ groups may independently be replaced by Q,

25 wherein Q has the meaning given above and wherein heteroatoms are not directly linked to each other;

30 Z¹, Z², Z³ each independently represents a single covalent bond or a spacer unit, such as a straight-chain or branched alkylene residue, which is unsubstituted, mono-substituted by cyano or halogeno, or poly-substituted by halogeno, having 1 to 8 carbon atoms, wherein one or more of the non-adjacent CH₂ groups may independently be

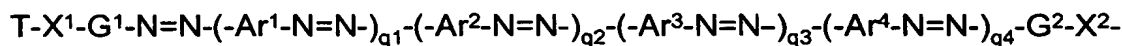
replaced by Q or -CR=C-CO-, wherein Q and R have the meaning given above;

m^1, m^2 independently are 0 or 1; and

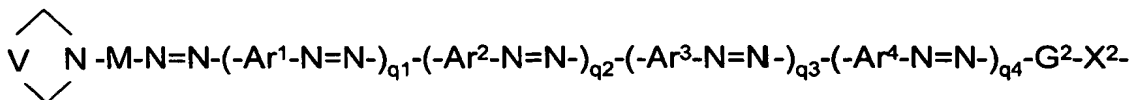
P represents hydrogen, halogeno, cyano, nitro or a polymerizable group PG; and

with the proviso that the compound of formula I comprises at least one polymerizable group.

2. A polymerizable dichroic azo dye according to claim 1, wherein the dichroic residue A is represented by formulae IIIa or IIIb:



IIIa



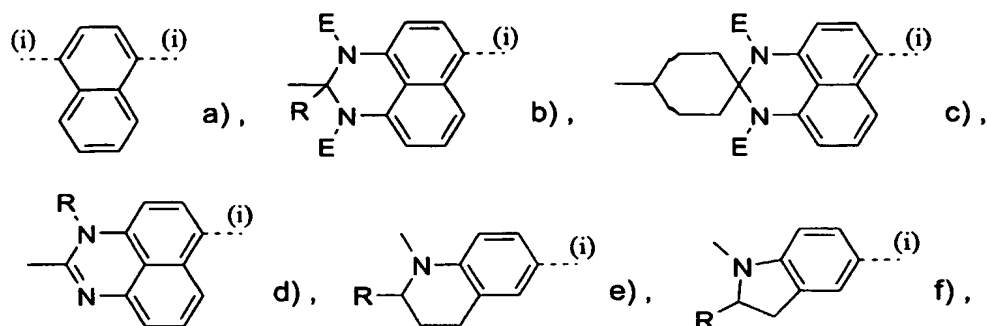
IIIb

wherein

Ar^1, Ar^2, Ar^3, Ar^4 independently of each other are 1,4-phenylene, 1,4- or 1,5-naphthylene, which are unsubstituted, mono- or poly-substituted by fluorine, chlorine, hydroxy, -NR¹R² or by a straight chain or branched alkyl residue having 1-10 carbon atoms, which alkyl residue is unsubstituted, mono- or poly-substituted by fluorine, and wherein one or more of the non-adjacent CH₂ groups may independently be replaced by Q, wherein Q has the meaning given above and R¹ and R² independently represent hydrogen or lower alkyl;

q^1, q^2, q^3, q^4 independently are 0 or 1;

G¹, G² represent independently of each other 1,4-phenylene or a group of formula a) to f)



5

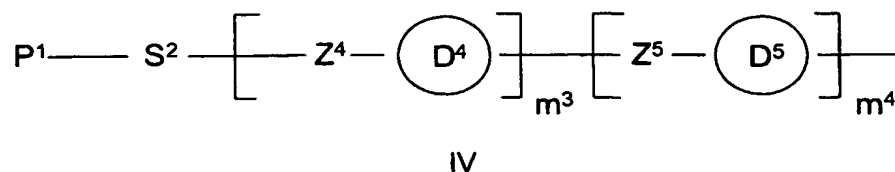
which are unsubstituted, mono- or poly-substituted by fluorine, chlorine, hydroxy, $-NR^1R^2$ or by a straight chain or branched alkyl residue having 1-10 carbon atoms, which alkyl residue is unsubstituted, mono- or poly-substituted by fluorine, and wherein one or more of the non-adjacent CH_2 groups may independently be replaced by $-O-$, $-CO-O-$, $-O-CO-$, $-NR^1-CO-$, $-CO-NR^1-$, $-NR^1-CO-O-$, $-O-CO-NR^1-$, $-CH=CH-$, $-C\equiv C-$, $-O-CO-O-$, wherein R^1 and R^2 independently represent hydrogen or lower alkyl and wherein the broken lines (i) symbolize the linkage to the azo-binding group and R, E have the meaning given above;

15

M represents 1,4-phenylene, 1,4-naphthylene which are unsubstituted, mono- or poly-substituted by fluorine, chlorine, hydroxy, $-NR^1R^2$ or by a straight chain or branched alkyl residue having 1-10 carbon atoms, which alkyl residue is unsubstituted, mono- or poly-substituted by fluorine, and wherein one or more of the non-adjacent CH_2 groups may independently be replaced by $-O-$, $-CO-O-$, $-O-CO-$, $-NR^1-CO-$, $-CO-NR^1-$, $-NR^1-CO-O-$, $-O-CO-NR^1-$, $-CH=CH-$, $-C\equiv C-$, $-O-CO-O-$, wherein R^1 and R^2 independently represent hydrogen or lower alkyl;

20

25 T represents a group of substructure IV



wherein

P¹ represents hydrogen, halogeno, cyano, nitro or a polymerizable group PG;

S² represents a single covalent bond or a spacer unit, such as a straight-chain or branched alkylene residue, which is unsubstituted, mono-substituted by cyano or halogeno, or poly-substituted by halogeno, having 1 to 24 carbon atoms, wherein one or more of the non-adjacent CH₂ groups may independently be replaced by Q, wherein Q has the meaning given above and such that heteroatoms are not directly linked to each other;

Z⁴, Z⁵ each independently represent a single covalent bond or a spacer unit, such as a straight-chain or branched alkylene residue, which is unsubstituted, mono-substituted by cyano or halogeno, or poly-substituted by halogeno, having 1 to 8 carbon atoms, wherein one or more of the non-adjacent CH₂ groups may independently be replaced by Q or -CR=C-CO-, wherein Q and R have the meaning given above; and

D⁴, D⁵ each independently represent an aromatic or alicyclic group, which is unsubstituted or substituted by fluorine, chlorine, cyano, nitro, or by a straight chain or branched alkyl residue having 1-10 carbon atoms, which alkyl residue is unsubstituted, mono- or poly-substituted by fluorine, and wherein one or more of the non-adjacent CH₂ groups may independently be replaced by Q, wherein Q has the meaning given above;

X¹, X² represent independently of each other a single covalent bond or a spacer unit, such as a straight-chain or branched alkylene residue, which is unsubstituted, mono-substituted by cyano or halogeno, or poly-substituted by halogeno, having 1 to 8 carbon atoms, wherein one or more of the non-adjacent CH₂ groups may independently be replaced by -O-, -CO-, -CO-O-, -O-CO-, -Si(CH₃)₂-O-Si(CH₃)₂-, -NW-, -NW-CO-, -CO-NW-, -NW-CO-O-, -O-CO-NW-, -NW-CO-NW-, -CH=CH-, -C≡C-, -O-CO-O- or -CW=C-CO-, wherein W represents a group of substructure V

P²- Sp- V

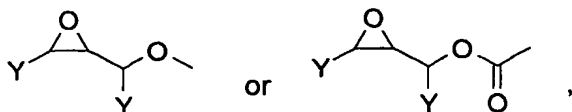
wherein

P² represents hydrogen, cyano or a polymerizable group PG; and
 Sp represents a single covalent bond or a spacer unit, such as a straight-chain or branched alkylene residue, which is unsubstituted, mono-substituted by cyano or halogeno, or poly-substituted by halogeno, having 1 to 5 carbon atoms, wherein one or more of the non-adjacent CH₂ groups may independently be replaced by -O-, -CO-, -CO-O-, -O-CO-, such that heteroatoms are not directly linked to each other;

V is selected from a group consisting of a single covalent bond, -CH₂-, -CH₂-CH₂-, -CH₂-CH₂-CH₂-, -CH₂-O-CH₂-, -CH₂-NT-CH₂-, -CH₂-(-CH₂)₂-CH₂-, wherein T has the meaning given above;

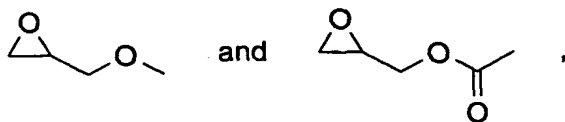
with the proviso that if G¹, G² and M are optionally substituted 1,4-phenylene, at least one of Ar¹, Ar², Ar³ or Ar⁴ is optionally substituted 1,4-naphthylene.

3. A polymerizable dichroic azo dye according to any preceding claim wherein the polymerizable groups PG are each independently preferably selected from the formulae CH₂=CY-, CH₂=CY-COO-, CH₂=CH-CO-NH-, CH₂=C(Ph)-CO-NH-, CH₂=CH-O-, CH₂=CH-OOC-, Ph-CH=CH-, CH₂=CH-Ph-, CH₂=CH-Ph-O-, CH₂=CH-Ph-OCO-, R³-Ph-CH=CH-COO-, R²-OOC-CH=CH-Ph-O-, N-maleinimidyl,



wherein Y each independently represents hydrogen, chloro or methyl, R² is hydrogen or lower alkyl, R³ is hydrogen or lower alkoxy, Ph- is phenyl and -Ph- is 1,4-phenylene.

4. A polymerizable dichroic azo dye according to claim 3, wherein the polymerizable groups PG are CH₂=CY-, CH₂=CY-COO-, CH₂=CH-O-, CH₂=CH-OOC-, CH₂=CH-Ph-O-, CH₂=CH-Ph-OCO-,



wherein Y is hydrogen or methyl.

5. A polymerizable dichroic azo dye according to claim 3, wherein the polymerizable groups PG are $\text{CH}_2=\text{CY}-\text{COO}-$, $\text{CH}_2=\text{CH}-\text{O}-$ and $\text{CH}_2=\text{CH}-\text{OOC}-$, wherein Y is hydrogen or methyl.

6. A polymerizable dichroic azo dye according to any preceding claim, wherein rings D^1 , D^2 , D^3 , D^4 and D^5 independently of each other are unsubstituted, saturated five- or six-membered alicyclic rings or six- or ten-membered aromatic rings, which are unsubstituted, mono- or poly-substituted by fluorine or chlorine or nitro or by a straight chain or branched alkyl residue having 1-6 carbon atoms, which alkyl residue is unsubstituted, mono- or poly-substituted by fluorine, and wherein one or more of the non-adjacent CH_2 groups may independently be replaced by $-\text{O}-$, $-\text{CO}-\text{O}-$, $-\text{O}-\text{CO}-$, $-\text{NR}^2-\text{CO}-$, $-\text{CO}-\text{NR}^2-$, $-\text{NR}^2-\text{CO}-\text{O}-$, $-\text{O}-\text{CO}-\text{NR}^2-$, $-\text{CH}=\text{CH}-$, $-\text{C}\equiv\text{C}-$, $-\text{O}-\text{CO}-\text{O}-$, wherein R^2 represents hydrogen or lower alkyl.

7. A polymerizable dichroic azo dye according to claim 6, wherein rings D^1 , D^2 , D^3 , D^4 and D^5 are unsubstituted cyclopentane-1,3-diyl, unsubstituted 1,3-dioxane-2,5-diyl, unsubstituted cyclohexane-1,4-diyl, unsubstituted naphthalene-2,6-diyl or 1,4-phenylene, which is unsubstituted, mono- or poly-substituted by fluorine or chlorine or by a straight-chain or branched alkyl residue having 1-3 carbon atoms, which alkyl residue is unsubstituted, mono- or poly-substituted by fluorine, and wherein one or more of the non-adjacent CH_2 groups may independently be replaced by $-\text{O}-$, $-\text{CO}-\text{O}-$, $-\text{O}-\text{CO}-$, $-\text{CH}=\text{CH}-$, $-\text{C}\equiv\text{C}-$.

8. A polymerizable dichroic azo dye according to claim 6, wherein rings D^1 , D^2 , D^3 , D^4 and D^5 are 1,4-phenylene, which is unsubstituted, mono- or poly-substituted by fluorine, chlorine, methyl, methoxy, acyl or $-\text{CO}-\text{O}-\text{CH}_3$.

9. A polymerizable dichroic azo dye according to any preceding claim, wherein the S^1 and S^2 comprise a single bond, or a straight-chain or branched alkylene grouping, such as $-(\text{CH}_2)_r-$, and also $-(\text{CH}_2)_r-\text{O}-(\text{CH}_2)_s-$, $-(\text{CH}_2)_r-\text{CO}-\text{O}-(\text{CH}_2)_s-$, $-(\text{CH}_2)_r-\text{O}-\text{CO}-(\text{CH}_2)_s-$, $-(\text{CH}_2)_r-\text{NR}^2-\text{CO}-(\text{CH}_2)_s-$, $-(\text{CH}_2)_r-\text{NR}^2-\text{CO}-\text{O}-(\text{CH}_2)_s-$, $-(\text{CH}_2)_r-(\text{OCH}_2\text{CH}_2)_s-(\text{CH}_2)_t-$ wherein r , s and t are each a n integer from 1 to 20, the sum of $r + s + t \leq 21$, wherein R^2 represents hydrogen or lower alkyl, and which are attached to the dichroic residue and the polymerizable group, respectively, such that heteroatoms are not directly linked to each other.

10. A polymerizable dichroic azo dye according to claim 9, wherein S^1 and S^2 are a single bond or a C_{1-14} straight-chain alkylene group, especially ethylene, propylene, butylene, pentylene, hexylene, heptylene, octylene, nonylene, decylene, undecylene, or dodecylene.

11. A polymerizable dichroic azo dye according to anyone of claims 2 to 10, wherein Sp is a single bond, or a straight-chain or branched alkylene grouping, such as a C_{1-5} straight-chain alkylene group, and also $-(CH_2)_u-O-(CH_2)_v-$, $-(CH_2)_u-CO-O-(CH_2)_v-$, $-(CH_2)_u-O-CO-(CH_2)_v-$, wherein u and v are each an integer from 1 to 4, the sum of $u + v \leq 4$.

12. A polymerizable dichroic azo dye according to claim 11, wherein Sp is a single bond and a C_{1-5} straight-chain alkylene group, especially ethylene, propylene, butylene or pentylene.

13. A polymerizable dichroic azo dye according to any preceding claim, wherein Z^1 , Z^2 , Z^3 , Z^4 and Z^5 are a single covalent bond or a straight-chain or branched alkylene residue, which is unsubstituted, mono-substituted or poly-substituted by fluoro, having 1 to 8 carbon atoms, wherein one or more of the non-adjacent CH_2 groups may independently be replaced by $-O-$, $-CO-$, $-CO-O-$, $-O-CO-$, $-NR^2-CO-$, $-CO-NR^2-$, $-NR^2-CO-O-$, $-O-CO-NR^2-$, $-CH=CH-$, $-C\equiv C-$, $-O-CO-O-$, $-CR^2=C-CO-$, wherein R^2 represents hydrogen or lower alkyl.

14. A polymerizable dichroic azo dye according to claim 13, wherein Z^1 , Z^2 , Z^3 , Z^4 and Z^5 groups are a single covalent bond or a straight-chain or branched alkylene residue, having 1 to 4 carbon atoms, wherein one or more of the non-adjacent CH_2 groups may independently be replaced by $-O-$, $-CO-O-$, $-O-CO-$, $-CH=CH-$, $-C\equiv C-$, $-O-CO-O-$, $-CR^2=C-CO-$, wherein R^2 represents hydrogen or lower alkyl.

15. A polymerizable dichroic azo dye according to claim 14, wherein Z^1 , Z^2 , Z^3 , Z^4 and Z^5 are each independently selected from a group consisting of a single covalent bond, $-CO-O-$, $-O-CO-$, $-CH_2-O-$ or $-O-CH_2-$.

16. A polymerizable dichroic azo dye according to any preceding claim, wherein E

represents hydrogen, methyl, acetyl, acryloyl and methacryloyl, especially hydrogen, methyl and acetyl.

- 5 17. A polymerizable dichroic azo dye according to any preceding claim, wherein the sum of the integers $m^1 + m^2$ is 0 or 1.
18. A polymerizable dichroic azo dye according to anyone of claims 2 to 17, wherein the sum of the integers $q^1 + q^2 + q^3 + q^4$ is 0, 1, 2.
- 10 19. A polymerizable dichroic azo dye according to anyone of claims 2 to 18, wherein X^1 and X^2 when linked to 1,4-phenylene or 1,4-naphthylene each independently represent a single covalent bond, -CO-O-, -O-CO-, -CH₂-O-, -O-CH₂-, -NW-, -CH₂-NW-, -NW-CH₂-, -N=CR-, -CR=N-, -NW-CO- or -CO-NW-, and preferably -CO-O-, -O-CO-, -CH₂-O-, -O-CH₂-, -NR- or -CH₂-NR-, -NR-CH₂-, -NR-CO- or -CO-NR-, wherein W and R have the meaning given above.
- 15 20. A polymerizable dichroic azo dye according to anyone of claims 2 to 18, wherein X^1 and X^2 when linked to a group of formula b), c) or d) each independently represent a single covalent bond, -CH₂-CH₂-, -O-CH₂...^(iv)-, -NW-CH₂...^(iv)-, -CH=CH-, -O-CH₂-CH₂-CH₂...^(iv) or -NW-CH₂-CH₂-CH₂...^(iv), preferably a single covalent bond, -CH₂-CH₂-, -O-CH₂...^(iv)-, -NW-CH₂...^(iv)-, -CH=CH-, and most preferably a single covalent bond or -CH₂-CH₂-, wherein W has the meaning given above and the broken lines (iv) symbolize the linkage to the groups of formula b), c) or d).
- 20 21. A polymerizable dichroic azo dye according to anyone of claims 2 to 18, wherein X^1 and X^2 when linked to a group of formula e) or f) each independently represent -CH₂-, -CO-, -CH₂-CH₂-CH₂-, -O-CH₂-CH₂...^(iv)-, -NW-CH₂-CH₂...^(iv)-, -CH=CH-CH₂...^(iv)-, -OCO-CH₂...^(iv) or -CH₂-OCO...^(iv)-, and preferably -CH₂- or -CO-, wherein W has the meaning given above and the broken lines (iv) symbolize the linkage to the groups of formula e) or f).
- 25 22. A polymerizable dichroic azo dye according to anyone of claims 2 to 18, wherein V is selected from a group consisting of -CH₂-CH₂-, -CH₂-CH₂-CH₂- or -CH₂-O-CH₂-.
- 30 23. A polymerizable dichroic azo dye according to anyone of claims 2 to 18, wherein
- 35

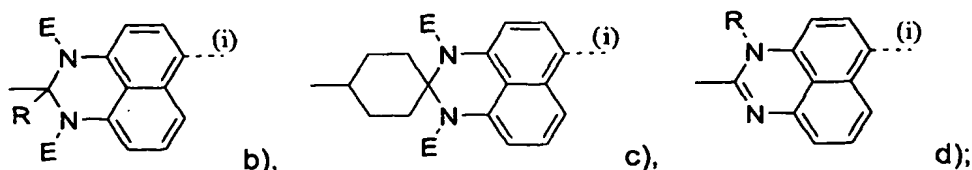
M is 1,4-phenylene, which is unsubstituted, monosubstituted by chlorine or -CH₃, with the proviso that at least one of Ar¹, Ar², Ar³ or Ar⁴ is optionally substituted 1,4-naphthylene

5 24. A polymerizable dichroic azo dye according to claim 23, wherein M is unsubstituted 1,4-phenylene, with the proviso that at least one of Ar¹, Ar², Ar³ or Ar⁴ is 1,4-naphthylene.

10 25. A polymerizable dichroic azo dye according to anyone of claims 2 to 24, wherein Ar¹, Ar², Ar³ and Ar⁴ independently of each other are 1,4-phenylene or 1,4-naphthylene, which are unsubstituted, mono- or disubstituted by fluorine, chlorine, -OCH₃ or -CH₃, with the proviso that at least one of Ar¹, Ar², Ar³ or Ar⁴ is optionally substituted 1,4-naphthylene if G¹ and G² are optionally substituted 1,4-phenylene.

15 26. A polymerizable dichroic azo dye according to claim 25, wherein Ar¹, Ar², Ar³ and Ar⁴ independently of each other are 1,4-phenylene, which is unsubstituted, mono- or disubstituted by chlorine or -CH₃ or unsubstituted 1,4-naphthylene, with the proviso that at least one of Ar¹, Ar², Ar³ or Ar⁴ is unsubstituted 1,4-naphthylene if G¹ and G² are optionally substituted 1,4-phenylene.

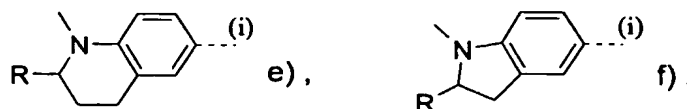
20 27. A polymerizable dichroic azo dye according to anyone of claims 2 to 26, wherein G¹ and G² independently of each other are 1,4-phenylene or 1,4-naphthylene, which are unsubstituted, mono- or disubstituted by fluorine, chlorine, -OCH₃ or -CH₃, preferably 1,4-phenylene, which is unsubstituted, mono- or disubstituted by chlorine or -CH₃ or unsubstituted 1,4-naphthylene; or a group of formula b), c) and d), preferably a group of formula b) and c), which are unsubstituted and wherein the broken lines (i) symbolize the linkage to the azo-binding group and R, E have the meaning given above



30

or

a group of formula e) and f), which is unsubstituted and wherein the broken lines (i) symbolize the linkage to the azo-binding group and R represents hydrogen or lower alkyl



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28. A polymerizable dichroic azo dye according to claim 27, wherein

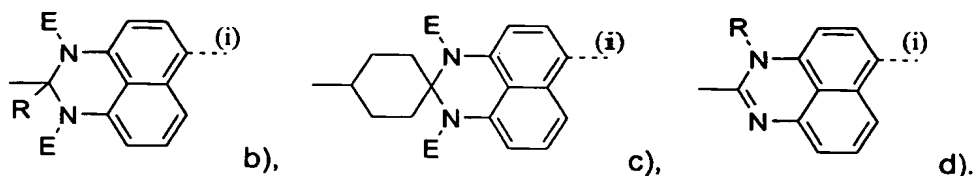
G¹ and G² independently of each other are

1,4-phenylene or 1,4-naphthylene, which are unsubstituted, mono- or disubstituted by fluorine, chlorine, -OCH₃ or -CH₃, preferably 1,4-

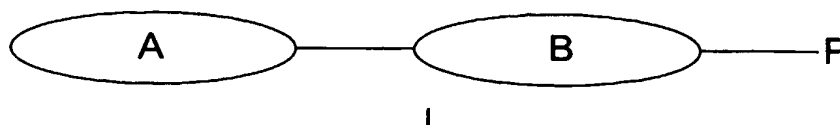
phenylene, which is unsubstituted, mono- or disubstituted by chlorine or -CH₃ or unsubstituted 1,4-naphthylene; or

a group of formula b), c) and d), preferably a group of formula b) and c), which are unsubstituted and wherein the broken lines (i) symbolize the

linkage to the azo-binding group and R, E have the meaning given above

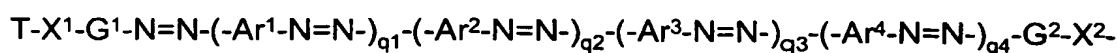


29. A polymerizable dichroic azo dye of the general formula I:



wherein

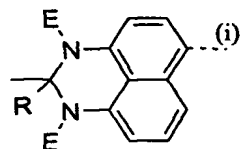
A is a dichroic residue of general formula IIIa,



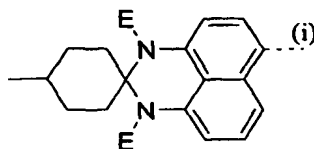
IIIa

wherein

G¹ and G² independently of each other represent 1,4-phenylene, which is unsubstituted, mono- or disubstituted by chlorine or -CH₃, or unsubstituted 1,4-naphthylene; or a group of formula b) or c)



b),



c),

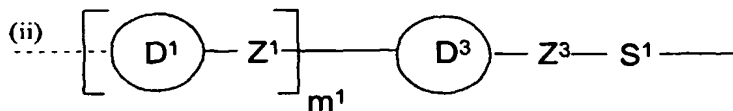
wherein the broken lines (i) symbolize the linkage to the azo-binding group; and wherein

E independently represents hydrogen, methyl and acetyl;

R independently represents hydrogen, methyl, ethyl, propyl and isopropyl;

X¹ and X² independently of each other represent a covalent bond, CH₂-CH₂-, -CO-O-, -O-CO-, -CH₂-O-, -O-CH₂-, -NR- or -CH₂-NR-, -NR-CH₂-, -NR-CO- or -CO-NR-, wherein R has the meaning given above;

B represents a group of substructure XXIII



XXIII

wherein the broken line (ii) symbolizes the linkage to said dichroic residue;

and wherein

Ar¹, Ar², Ar³, Ar⁴ are independently of each other 1,4-phenylene, which is unsubstituted, mono- or disubstituted by chlorine or -CH₃, or unsubstituted 1,4-naphthylene, with the proviso that if G¹ and G² are optionally substituted 1,4-phenylene at least one of Ar¹, Ar², Ar³ or Ar⁴ is unsubstituted 1,4-naphthylene;

q¹, q², q³, q⁴ independently are 0 or 1, with the proviso that the sum of the integers q¹ + q² + q³ + q⁴ = 0, 1, or 2;

P and P¹ independently of each other represent hydrogen, halogeno, cyano, nitro or a polymerizable group PG, wherein PG includes CH₂=CY-COO-, CH₂=CH-O- and CH₂=CH-OOC-, wherein Y is hydrogen or methyl;

5 D¹, D³, D⁴ and D⁵ independently of each other represent 1,4-phenylene, which is unsubstituted, mono- or poly-substituted by fluorine, chlorine, methyl, methoxy, acyl or -CO-O-CH₃;

10 Z¹, Z³, Z⁴ and Z⁵ independently of each other represent selected from a group consisting of a single covalent bond, -CO-O-, -O-CO-, -CH₂-O- or -O-CH₂-;

S¹ and S² represent independently of each other a single bond, ethylene, propylene, butylene, pentylene, hexylene, heptylene, octylene, nonylene, decylene, undecylene, or dodecylene and

15

m¹, m³, m⁴ are independently of each other 0 or 1.

20 30. A polymerizable dichroic azo dye according to claim 29, wherein if G¹ and G² independently of each other represent a group of formula b) or c), X¹ and X² independently of each other represent a covalent bond or CH₂-CH₂-.

31. Use of a polymerizable dichroic azo dye according to any preceding claim for the preparation of mesogenic, polymerizable mixtures.

25 32. A mesogenic, polymerizable mixture comprising at least one polymerizable dichroic azo dye of formula I according to any preceding claim.

30 33. A mesogenic, polymerizable mixture according to claim 32, wherein the polymerizable dichroic azo dye is at a concentration of 0.01 to 50 %wt, more preferably from 0.01 to 20 %wt, most preferably from 0.01 to 10 %wt.

34. A mesogenic, polymerizable mixture according to claim 32 or 33 further comprising another dichroic or non-dichroic dye.

35. A mesogenic, polymerizable mixture according to anyone of claims 32 to 34 further comprising at least one polymerizable liquid crystal (LCP).

36. A mesogenic, polymerizable mixture according to anyone of claims 32 to 35 further comprising additives such as crosslinkers, stabilizers and photoinitiators.

37. A mesogenic, polymerizable mixture according to anyone of claims 32 to 36 comprising at least one dichroic dye of formula I and at least one polymerizable liquid crystal compound and optionally additives such as crosslinkers, stabilizers and photoinitiators.

38. A mesogenic, polymerizable mixture according to anyone of claims 32 to 37 comprising one to four dichroic dyes of formula I and at least one polymerizable liquid crystal compound comprising two polymerizable groups and optionally additives such as crosslinkers, stabilizers and photoinitiators.

39. Use of a mesogenic, polymerizable mixture according to anyone of claims 32 to 38 for the preparation of dichroic liquid crystalline polymer films.

40. A dichroic liquid crystalline polymer film comprising a mesogenic, polymerizable mixture according to anyone of claims 32 to 38.

41. Use of a dichroic liquid crystal film according to claim 40 in the manufacture of devices such as polarizers or optical filters.

42. Process of preparing a dichroic liquid crystalline polymer film comprising a mesogenic, polymerizable mixture according to anyone of claims 32 to 38 comprising

- (i) preparing a solution of said mixture,
- (ii) applying said solution to a substrate by different coating techniques,
- (iii) evaporating the solvent to obtain a film, and
- (iv) polymerizing said film using UV light to give said dichroic liquid crystal film.

43. Process according to claim 42, wherein the dichroic liquid crystal films are further coated with other layers, such as protective layers for protection against oxygen, UV irradiation or mechanical stress.

44. Process according to claims 42 or 43, wherein the substrates include transparent substrates, such as glass or plastic, including an orientation layer.

5 45. Process according to claim 44, wherein said orientation layer includes rubbed polyimide, or polyamide or preferably layers of photo-orientable materials.

46. Process according to claim 45, wherein said photo-orientable orientation layers are Linearly Photopolymerizable Polymers (LPP).

10 47. Multilayer systems formed from stacks of alternating LPP and LCP layers, wherein at least one of the LCP layers is a dichroic LCP film according to claim 40, and which are optionally covered by other functional layers, such as protecting layers against oxygen or humidity or layers for protection against ultraviolet radiation.

15 48. Process of preparing a dichroic liquid crystalline polymer film comprising a mesogenic, polymerizable mixture according to anyone of claims 32 to 38 comprising
(i) preparing a solution of said mixture,
(ii) admixing said solution with a photoorientable material,
20 (iii) evaporating the solvent to obtain a film, and
(iv) polymerizing said film using UV light to give said dichroic liquid crystal film.

49. Use of a mesogenic, polymerizable mixture according to anyone of claims 32 to 38 for the preparation of electro-optical and optical devices including security devices.

25 50. Use of a dichroic liquid crystalline polymer film according to claim 40 for the preparation of electro-optical and optical devices including security devices.

30 51. Electro-optical or optical component or a security device comprising a dichroic liquid crystalline polymer film formed from a mesogenic, polymerizable mixture according to anyone of claims 32 to 38.

52. Orientation layer comprising at least one polymerizable dichroic azo dye according to anyone of claims 1 to 30.

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53. Orientation layer according to claim 52 further comprising rubbed polyimide, or polyamide or preferably layers of photo-orientable materials.

5 54. Use of an orientation layer according to claims 52 or 53 in the manufacture of optical or electro-optical components, such as structured or unstructured optical filters, polarizers or elements of security devices.